

MIDDLE EAR DISEASE IN A PREHISTORIC IRANIAN POPULATION

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THIS paper describes middle-ear disease as evidenced in skeletal material from Dinkha Tepe, Iran, dated between 1300 and 300 B.C. The skeletons were recovered in 1966 and 1969 by the combined efforts of the Metropolitan Museum of Art in New York, the University Museum of the University of Pennsylvania in Philadelphia, and the Iranian Archaeological Service.^{1,2} Of 45 skeletons from this expedition, which are now at the University of South Carolina, 15 that had one or more of the mastoid or petrous portions of the temporal bone intact were chosen for study.

Both acute and chronic middle-ear disease may involve the surrounding bony tissue and may manifest itself as osteofibrosis, sclerosis, or cholesteatomatous infiltration.³ The change in bony tissue may be detected in skeletal remains by a number of methods: gross observation, microscopy, or radiology. Our gross and radiological observations of the skeletal changes cast no light upon the cause, pathogenesis, or even the specific type of middle-ear disease encountered.⁴ Therefore, we shall use the terms "otitis media" and "mastoiditis" only in the sense of inflammation of the middle ear and mastoid areas. The extent of inflammation required to produce detectable changes in the temporal bone varies among individuals and, possibly, among populations. From skeletal evidence it is difficult to detect how severely the symptoms affected a particular individual.⁵

Before the antibiotic era middle-ear disease ran an acute course in which the individual often died within a few days. In the chronic form the patient was asymptomatic or mildly symptomatic for months or years.³ Both acute and chronic otitis media and mastoiditis may produce sclerosis of the petrous portion of the temporal bones and may lead to fixation of the

stapes footplate and deafness.^{6,7} Other possible results include abscess formation, perforation of the mastoid, and sinus formation with drainage. Mastoiditis also may cause depneumatization of the mastoid air cells.⁸ Whether the decrease of air cells in the mastoid is a developmental factor which predisposes a person to middle-ear disease or a direct result of that disease is controversial. Most otolaryngologists and radiologists argue that pneumatization of the mastoid area is influenced by infection and that radiographic evidence of altered mastoid air cells indicates previous middle ear disease, most likely infections from the nasopharynx through the eustachian tubes.⁸

METHOD

Each of the 15 skulls was examined grossly for evidence of disease or other conditions that would influence or affect the temporal bones. Roentgenograms were made, using both the Law lateral and Stenvers oblique anterior-posterior views of the skulls. Standard radiographic procedures⁹ were used for positioning and exposure.

Depneumatization of the mastoids and visible changes were considered diagnostic criteria. The visible changes included: 1) local overgrowths of osseous tissue anywhere in the otic capsule, 2) apparent sclerosis of the entire otic capsule, almost obscuring the labyrinthine system in some instances, with the opaque area tending to have a nodular outline, and 3) hyperostosis of the entire petrous pyramid.^{10,11} Only those skulls which exhibited evidence of middle-ear disease are included in the following discussion.

RESULTS

Burial No. 66-23-395 (B10a B11) is a 25-to-30-year-old man from Period II (Iron Age). Most of both the right and left temporal bones are intact, but some of the right petrous portion is missing. The majority of the outer table of the left mastoid is eroded. Radiographic examination demonstrates that the right mastoid is severely depneumatized with marked sclerosis in the right petrous portion. The left mastoid and petrous portion appear normal. This suggests the diagnosis of right otitis media and mastoiditis.

Burial No. 69-33-2 (B9/10a 3 7) is a 25-to-35-year-old female from Period IV (Bronze Age). The right mastoid appears normal under gross observations, but radiographic examination reveals depneumatization, with

a few large, consolidated air cells. The air cells are not highly visible under x-ray examination. The petrous pyramid is markedly sclerotic. The left mastoid is crushed upward and there is evidence of bone regrowth, suggesting that a crushing injury occurred during the individual's lifetime. The left petrous portion appears normal. The diagnosis is right otitis media and mastoiditis, with the left mastoid traumatized.

Burial No. 66-23-403 (G10g B2) is a woman aged 35 years or older from Period III (Iron Age, but no grave furniture). Gross observation of this individual shows bilateral normality. Radiography shows the right middle ear, the mastoid, and left petrous portion to be normal. The left mastoid shows a slight degree of depneumatization bordering on disease. Possible left mastoiditis is suggested.

Burial No. 69-33-3 (B9/10a B1) is a man aged 35 years or older from Period IV (Bronze Age). Direct observation shows both temporal bones to be intact. A large lesion is evident on the interior aspect of the right temporal bone just superior to the mastoid. There seems to be a sinus tract connecting the lesion and the mastoid. Another lesion is evident on the inferior aspect of the right petrous portion. Radiographs clearly show both lesions and some depneumatization of the right mastoid, with marked sclerosis of the petrous pyramid. The left mastoid and petrous portion are within normal limits. Our diagnosis is right otitis media and mastoiditis with abscesses.

Burial No. 66-23-404 (H1h B14) is a man aged 21 to 35 years from Period III (Iron Age, but no grave furniture). Gross examination demonstrates that both temporal bones are intact. Some pitting and sinuses appear on the left mastoid and one sinus with pitting is just superior to the external auditory meatus. The right petrous portion looks disturbed. With radiologic examination we found that the right mastoid is depneumatized and that the right pyramid is sclerotic. The left mastoid is significantly depneumatized, with thickening of the walls and a few consolidated cells left. Bilateral otitis media and mastoiditis with sinus perforation of the left mastoid is suggested.

Burial No. 66-23-399 (B10a B22) is an adult man from Period III (Iron Age). Gross observation of this individual reveals no abnormalities for the two intact temporals. Radiographs show a normal right mastoid which is fairly well pneumatized and a normal right petrous portion. The left mastoid is severely depneumatized and sclerotic but the petrous portion appears normal. Only left mastoiditis is indicated.

Burial No. 69-33-7 (G10c B6) is a 21-to-35-year-old man from Period IV (Bronze Age, but no grave furniture). Gross observation of this skull reveals no abnormalities of either temporal bone. This individual has a long open fissure, perhaps from a sword blow, which extends from the right parietal across the posterior left parietal. The left temporal bone is not directly involved. The lesion undoubtedly was traumatic in origin and shows evidence of healing. Radiographic examination reveals two grossly depneumatized mastoids; the right has only one large consolidated cell. Sclerosis of the petrous portion is marked on both sides. Our diagnosis is bilateral otitis media and mastoiditis. There is not enough evidence to suggest a relation between the traumatic lesion and the middle ear disease.

CONCLUSIONS

Of the 15 skulls studied, six had definite evidence of middle-ear disease and one borderline case was present. Excluding the questionable case, 40% of this sample had middle-ear disease severe enough to cause skeletal damage.

It is difficult to denote any chronologic trends because of the small number of skulls from each period, but conclusions may be suggested for the population as a whole. The chronologic distribution is as follows: three of seven individuals from the Iron Age (300-700 B.C.) and three of four individuals from the Bronze Age (1000-1300 B.C.).

Of the six males, six females, and three subadults examined at Dinkha Tepe, five males and only one female were affected. In contrast, Guild¹² reported middle-ear disease as more frequent among females.

Although 40% might appear to be a high frequency of disease, Gregg et al. found a similar rate among North American plains Indians.⁸ If these samples represent the actual incidence of middle-ear disease in the groups, the condition was an important illness in these societies. Hearing impairment associated with abscesses and drainage from acute and chronic mastoiditis certainly would lower the productivity of afflicted individuals. It should be noted that in both the Bronze and Iron Age samples at Dinkha Tepe the individuals died in their productive years rather than in old age.

Although the cause of the middle-ear disease that afflicted these metal-age Iranians has not been established, we hope that the documentation of probable hearing loss for a large segment of this population can assist in defining their over-all disease burden.

ACKNOWLEDGMENTS

We thank Robert H. Dyson of the University of Pennsylvania for the opportunity to study these skeletal materials and C. H. Biser and his staff at the University of South Carolina student health center for radiographic assistance.

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